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Two new generic names for some Australian pufferfishes (Tetraodontiformes: Tetraodontidae), with species' redescriptions and osteological comparisons

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ABSTRACT

Marilyna n. gen. is proposed for three Australian pufferfish species, *M. pleurosticta* (Günther), *M. meraukensis* (de Beaufort), and *M. darwinii* (Castelnau). *M. meraukensis* is recorded extensively from Australia for the first time, and *M. darwinii,* long ignored by ichtyologists is confirmed as a valid, applicable name.

Marilyna is characterised by a broad, heavily built body, eyes set below the dorsal profile, nasal organ with two openings, eye rim completely adnate, a large olfactory foramen in each prefrontal, and a deep caudal peduncle.

Reicheltia n. gen. is proposed for the single species *R. halsteadi* (Whitley). It differs from *Marilyna* in the lighter built, narrower body, eyes interrupting the dorsal profile, a small olfactory foramen in each prefrontal, and a shallow caudal peduncle.

INTRODUCTION

The Australian pufferfishes have long been subject to taxonomic confusion. Ongoing studies have disclosed not only several formerly unrecognised species, but also several inadequacies in the generic allocations of previously described species (see also Hardy, 1980, 1981a, b; Hardy & Hutchins, 1981).

The Australian species possessing a nasal organ with two nostrils (as opposed to single or double nasal flaps), can be separated into a number of readily recognisable (generic) groups, characterised by considerable endemism. Such separation can be made almost wholly on morphological grounds and is confirmed by examination of osteological features. Accordingly, *Torquigener* Whitley, presently under revision, is distinct from all other related Australian genera in having the ventral rim of the eye infolded (i.e. eye rim dorsally adnate only). The species considered in this paper differ from *Contusus* species by the presence of a ventrolateral skinfold (Hardy, 1981b). However, because the habit of previous workers has been to arbitrarily include many Australian species under "catch-all" generic names, it has been found necessary to introduce two new generic names, one for *Sphaeroides halsteadi* Whitley, and one for *Sphoeroides meraukensis* de Beaufort, *Tetrodon pleurostictus* Günther and *T. darwinii* Castelnau. All four species have been hitherto poorly known; indeed *T. darwinii* has been all but completely ignored for nearly 100 years, with a synonymous name for the species (*T. fasciatus* MacLeay) being included under *T. pleurostictus* for over 50 years, despite gross morphological and osteological differences.

METHODS AND ABBREVIATIONS

Measurements were taken by dial caliper and millimetre rule (to the nearest 0.1 mm for dimensions less than 10 mm), in a manner similar to that outlined by Dekkers (1975). All measurements are from preserved specimens. Fin ray counts include all visible rays, both branched and unbranched, and fin ray lengths were determined by measurement from the embedded base. One example of each species was cleared and stained; 60 specimens in total were X-rayed, for examination of their osteology.

The following abbreviations are used in the text:

SL,	standard length;
TL,	total length;
HL,	head length;
n,	number of specimens examined;
m,	depth in metres (precedes specimen registration number in lists of material examined);
AMS,	Australian Museum, Sydney;
ANSP,	Academy of Natural Sciences, Philadelphia;
BMNH,	British Museum (Natural History), London;
CSIRO,	Commonwealth Scientific and Industrial Research Organisation, Fisheries & Oceanography Division, Cronulla;
MNHN,	Muséum National d'Histoire Naturelle, Paris;
NMNZ,	National Museum of New Zealand, Wellington;
NTFD,	Northern Territories Fisheries Division, Darwin;
QM,	Queensland Museum, Brisbane;
WAM,	Western Australian Museum, Perth;
ZMA,	Zoological Museum, Amsterdam.

DESCRIPTIONS

Marilyna n.gen.

Type species: *Tetrodon pleurostictus* Günther, 1872:653, 674, pl.69A.

DIAGNOSIS

A genus of tetraodontid fishes with the following combination of characters: broad, heavily-built body; nasal organ with two unequally sized openings; eye rim completely adnate; top of pectoral fin base above lower margin of eye; weak ventrolateral skin fold present on caudal peduncle; deep caudal peduncle (least depth $< 9.5 \times$ in SL); prefrontals large and broadly rounded, each with an extensive olfactory foramen, and in broad contact with palatine; frontals wide over orbit; sphenotic in contact with supraoccipital.

ETYMOLOGY

The genus is named after my wife Marilyn, who spared no efforts in bibliographic research throughout my studies on Australian tetraodontids, and who assisted uncomplainingly at poison stations in the hot, muddy, and potentially dangerous mangrove swamps of North Queensland.

REMARKS

There has been little pattern in the history of generic allocation of *Marilyna* species. *Tetraodon* (or *Tetrodon*) has often been used for *fasciatus* (junior synonym of *T. darwinii* Castelnau) and *pleurosticta,* and *Sphoeroides* (or *Sphaeroides* or *Spheroides*) for *pleurosticta* and *meraukensis.* It is now quite clear following the works of Shipp (1974), Dekkers (1975), and Tyler (1980), that *Tetraodon* and *Sphoeroides* are inadmissible generic names for the above species.

Fraser-Brunner (1943) referred *pleurosticta* (as *pleurostictus*) to *Torquigener* and has been followed in this respect by Munro (1956), Tyler (1970, 1980), and Tyler and Paxton (1979). However, Munro (1967) referred *pleurosticta*

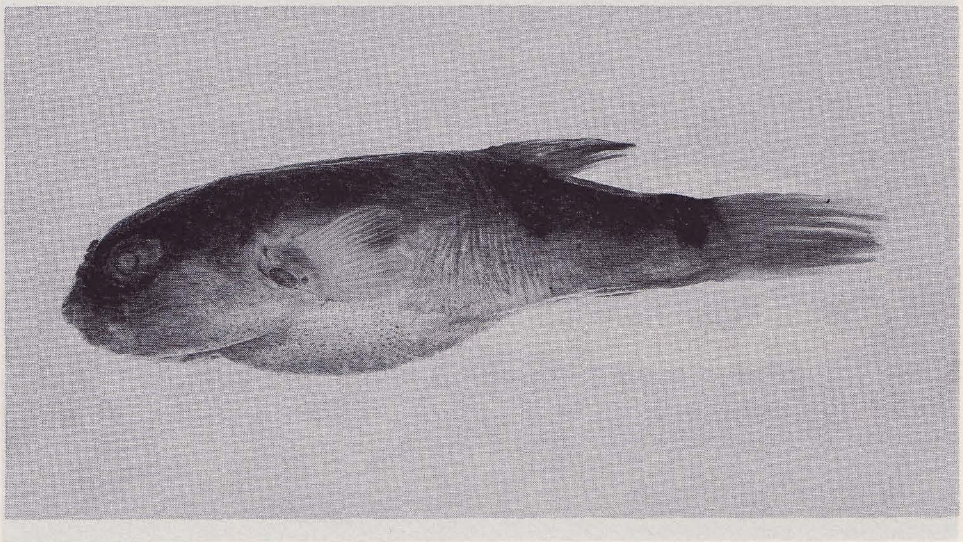


Fig. 1a. *Marilyna pleurosticta*
Lectotype, BMNH 1871. 9. 13. 128, 82 mm SL.

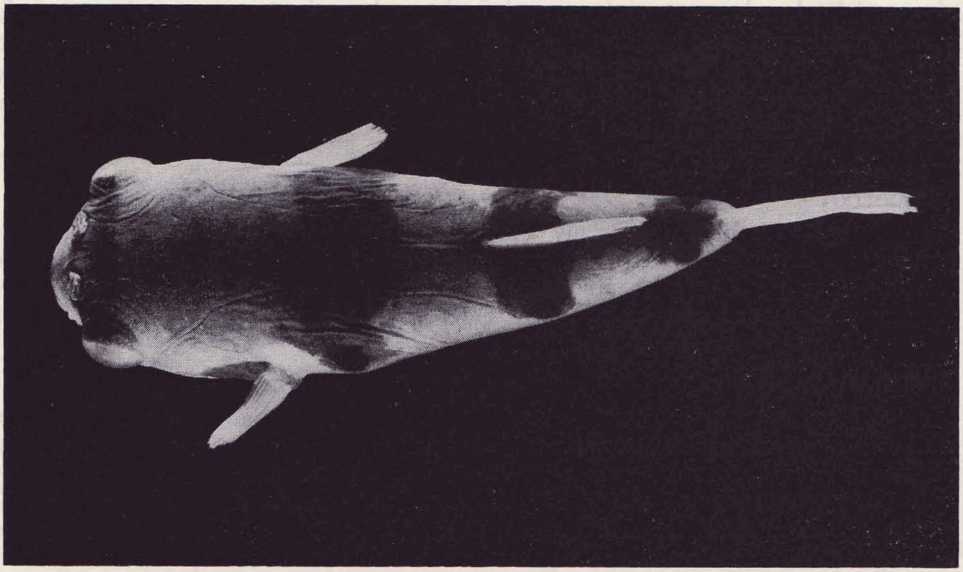


Fig. 1b. *Marilyna pleurosticta*
NMNZ P. 10166, 79mm SL dorsal view.

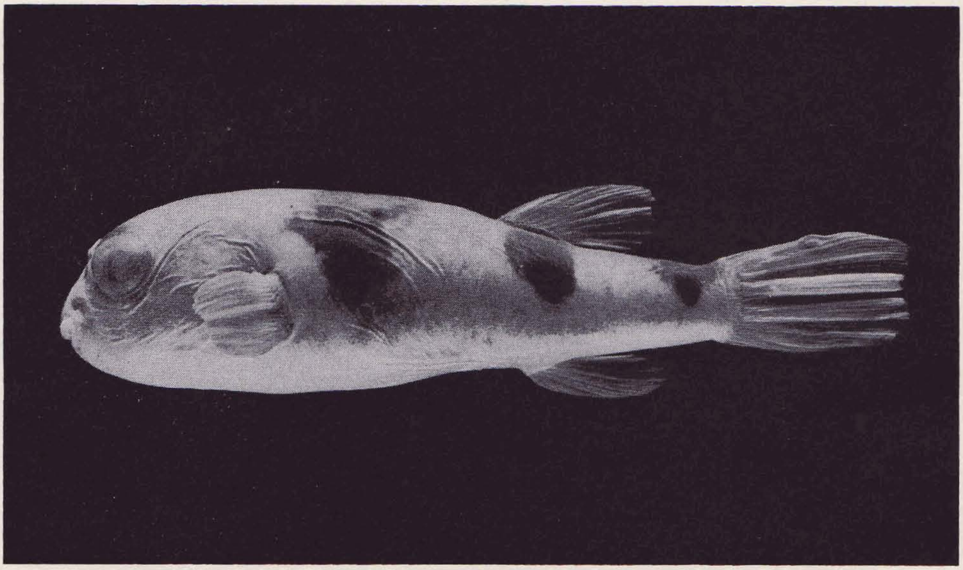


Fig. 1c. *Marilyna pleurosticta*
NMNZ P. 10166, 79 mm SL, lateral view.

(as *pleurostictus*) (a misidentification of *darwinii*) without comment to *Torafugu* Abe, 1939, and *meraukensis* to *Takifugu* Abe, 1949. Both generic names were originally proposed by Abe at the subgeneric level. My examination of examples of species referred to these subgeneric names by Abe (1939, 1949, 1952), shows them to be generically distinct from *Marilyna* species, differing amongst other features, in eye rim structure. Whitley's (1965) inclusion of *pleurostictus* in *Gastrophysus* was unexplained.

Marilyna pleurosticta (Günther, 1872)

(Figs. 1A, B, C; 5A)

Tetrodon pleurostictus Günther, 1872, 653, 674, pl. 69A; MacLeay, 1881, 276; ———, 1882, 340; Regan, 1903, 302 (part); Günther, 1910, 463; de Beaufort, 1955, 54; ———, 1962, 383; Tyler, 1964, 128.

Tetrodon bibroni Castelnau, 1878, 247; MacLeay, 1881, 276; ———, 1882, 340; Stead, 1907, 27; McCulloch & Whitley, 1925, 178.

Tetrodon laevis de Vis, 1884, 456.

Spheroides laevis. Jordan & Seale, 1906, 368.

Sphaeroides pleurostictus. Stead, 1907, 27; Kabata, 1968, 519.

Tetrodon bibronii. McCulloch & Whitley, 1925, 178.

Spheroides pleurostictus. McCulloch & Whitley, 1925, 178; McCulloch, 1927, 103; ———, 1929-30, 431 (part); Marshall, 1964, 493-4, colour pl. 70 (part); ———, 1966, 221, colour pl. 70 (part); Thomson, 1977, 63.

Sphoeroides pleurostictus. Fowler, 1928, 468 (part); de Beaufort, 1962, 376, 382-3 (part).

Torquigener pleurostictus. Fraser-Brunner, 1943, 11 (part); Tyler, 1970, 22; ———, 1980, 291, 330, 331, Fig. 215, 267, Table 2; ——— & Paxton, 1979, 22.

Colomesus fasciatus (not of Bloch & Schneider). Le Danois, 1959, 211, 246, 253, 255, Fig. 177-178 (part); Tyler, 1964, 127 (part).

Gastrophysus pleurostictus. Whitley, 1965, 59 (part); Carcasson, 1977, 275.

Spheroides (= *Torafugu*) *pleurostictus.* Grant, 1978, 617, colour pl. 273 (part).

DIAGNOSIS

Marilyna with spines present only as a dense patch on belly, extending from level with posterior margin of eyes to level with posterior of pectoral fin margin. Four broad, dark bands cross body, posteriormost band on distal portion of caudal peduncle.

Prefrontals somewhat triangular in outline, with moderately large olfactory nerve foramina. Sphenotic wings laterally produced. Small but distinct triturating teeth on upper jaw.

DESCRIPTION

The following meristic counts and proportions are for the lectotype (82 mm SL), and, in parenthesis, are the range for the paralectotype and 22 non-type specimens (72-131 mm SL).

Dorsal rays 11 (9-11); anal rays 8 (8-9); pectoral rays 16-17 (16-18); caudal rays 11 (11); vertebrae 8 + 11 (8 + 10, 8 + 11, 9 + 11, 8 + 12, 8 + 13).

Body robust, broadly rounded dorsally and flattened ventrally, elongate, tapering to a deep caudal peduncle. Head length 3.1 (3.0-3.1) in SL; snout to anterior of vent 1.6 (1.5-1.6) in SL, to origin of dorsal fin 1.5 (1.5-1.6) in SL, to origin of anal fin 1.4 (1.4-1.5) in SL, to origin of pectoral fin 2.7 (2.7-3.0) in SL; body width at base of pectoral fin 3.3 (2.9-3.7) in SL; depth from dorsal fin origin to anal fin origin 4.1 (4.0-4.8) in SL; body depth at posterior end of dorsal fin base 5.9 (5.6-6.4) in SL; caudal peduncle length 4.3 (4.3-4.9) in SL; least depth of caudal peduncle 8.3 (8.3-9.2) in SL.

Mouth small and terminal on a moderately short snout, width 3.0 (2.5-3.4) in HL. Lips thick, covered with numerous short papillae. Chin lacking. Nasal organ a short papilla just forward of eye, with 2 widely separated openings, the posterior one larger; inner surface of papilla with a large fold sited posteriorly on medial portion and about 4 smaller folds sited posteriorly on the ventral portion. Snout to anterior edge of nasal organ 3.3 (2.6-3.4) in HL; posterior edge of nasal organ to anterior edge of eye 6.5 (6.4-7.7) in HL.

Eye round, moderate in size and rim completely adnate, with the upper border just below dorsal profile, and the lower border just above level of mouth corner; horizontal diameter 4.1 (3.5-4.5) in HL. Anterior edge of gill opening smooth. Posterior of eye to dorsal corner of gill opening 2.2 (1.9-2.4) in HL.

Pectoral fin margins rounded; 1st ray very short; maximum length of fin from base 6.1 (6.2-7.2) in SL; top of fin base above lower margin of eye. Dorsal fin located posterior to vent, fails to reach caudal fin base, distal margin bluntly pointed; 1st ray 24.1 (10.6-26.5) in SL; longest ray 5.1 (4.9-5.8) in SL; base length 8.7 (8.6-10.7) in SL and 1.7 (1.6-2.0) in longest ray. Anal fin base below posterior half of dorsal fin base; distal margin bluntly pointed and fails to reach caudal fin base; 1st ray 15.2 (10.2-19.8) in SL; longest ray 5.7 (5.4-6.1) in SL; base length 13.9 (13.3-16.2) in SL and 2.5 (2.3-2.8) in longest ray. Caudal fin truncate; maximum length 4.3 (3.8-4.9) in SL.

Ventrolateral skinfold extending from behind pectoral fin to caudal fin. Lateral line fairly distinct, encircling eye with a pre-opercular branch dropping to anterolateral limit of belly, running dorsolaterally along body towards caudal fin, rising over pectoral fin and gently dropping to lateral surface in region of dorsal fin; dorsolateral branches of lateral line above pectoral fin base and anterodorsal branches anterior to nasal papillae both meeting in middle; second lateral line dropping from behind mouth corner, extending along lateral region of belly and curving almost to pectoral fin base, continuing along belly from posterior limit of belly spines, medial to ventrolateral skinfold, almost to caudal fin. Body spines multi-rooted, and restricted to a dense arrangement on belly, extending from level of eye to posterior margin of pectoral fin.

Colour in alcohol (*lectotype*): dorsum dark brown; slightly darker bands cross interorbital and mid-dorsal regions; darkish patch at dorsal and caudal fin bases; lateral surface becoming pale, with dark spots at posterior of pectoral fin margin and beneath dorsal fin base. Belly and fins pale.

Colour in life (*based on underwater observations*): ground colour of dorsum and dorso-lateral surface pale olive-green to dark greenish-grey; dark bands, either solid or composed of irregularly distributed round spots, cross dorsum at eyes, mid-dorsum, dorsal fin base, and distal end of caudal peduncle; these bands either extend almost to ventro-lateral region, or remain distinct from moderate to large, dark, lateral blotches; ventro-lateral surface pale or with silverish sheen; belly and chin white; pectoral and dorsal fins tinged reddish to reddish-yellow; anal fin bright orange to yellow; caudal fin reddish-yellow, becoming bright orange distally.

DISTRIBUTION

It is recorded only from the Australian east coast, from Cooktown, North Queensland, to Smith's Lake, N.S.W., and is a shallow water, predominantly estuarine species.

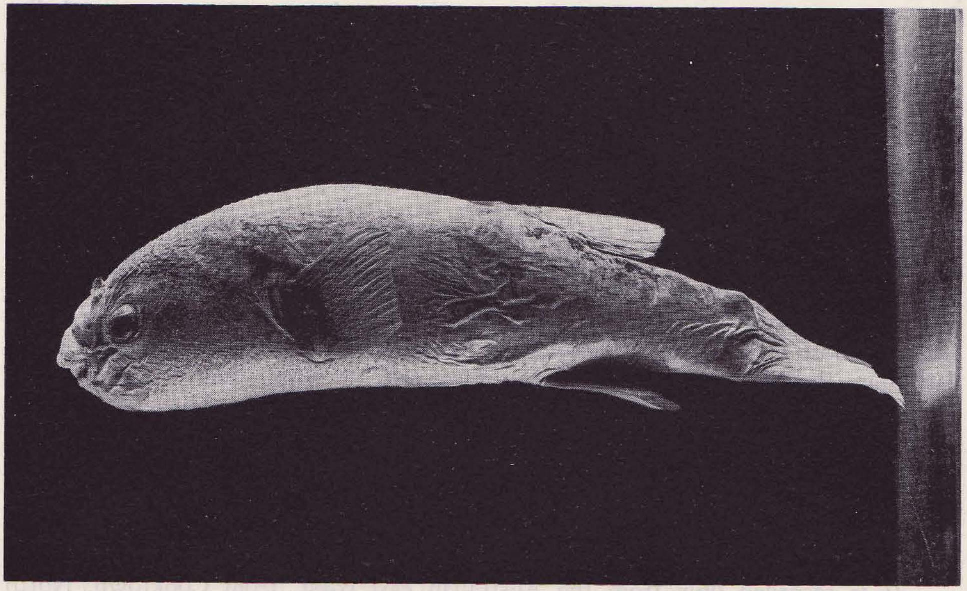
REMARKS

Recognition of Günther's (1872) type specimens of *Tetrodon pleurostictus* is straight forward and there is no direct indication that he had further material at hand. However, his description of *pleurostictus* referred to the species sometimes having minute dorsal spines. Such a feature is missing on the syntypes, and has not been found in any example of the species. Accordingly one must conclude that Günther had examined further specifically distinct material, which he mistakenly included in *pleurostictus.* Nonetheless, the identity of the types (BMNH 1871. 9.13.128 here designated as lectotype) fixes the use of the name *pleurosticta* for the species concerned.

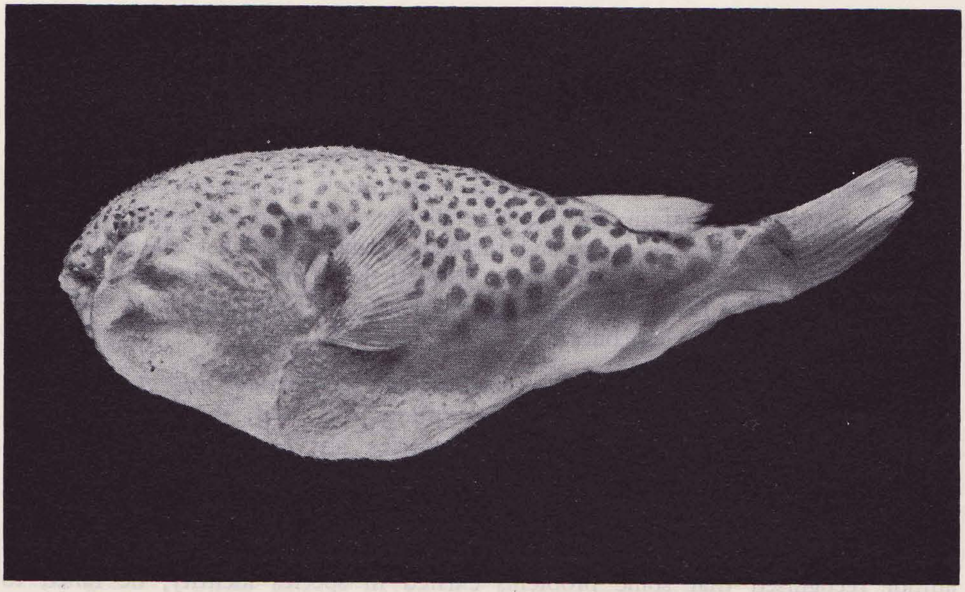
I have not been able to locate type material of *Tetrodon bibroni* Castelnau and *T. laevis* de Vis. Although the descriptions are brief, the colour patterns and spine distributions given for these species are consistent with that of *pleurosticta.*

De Beaufort (1962) and Munro (1967) clearly confused *pleurosticta* with *fasciatus* (= *darwinii*), in referring to dorsal spination, and whilst the former author recognised that some problems existed in species identity, he failed to resolve them.

Fig. 2. *Marilyna meraukensis*



A. Lectotype, ZMA 104. 139, 196 mm SL.



B. WAM unreg., 76 mm SL.

Tyler (1980, fig. 215) illustrated the lateral lines and nasal organ of this species, which he called *Torquigener pleurostictus.*

SPECIMENS EXAMINED

(n = 47; 2 or more specimens in a lot is indicated by a number in parenthesis).

Lectotype: BMNH 1871. 9.13.128, 82 mm SL, Mr. Schmeltz, Port Bowen, Queensland.

Paralectotype: BMNH 1871, 9.13.127, 72 mm SL, Port Mackay, Queensland.

Non-Type Specimens: Queensland — Endeavour River estuary, Cooktown, AMS I. 1488-90 (3); Finches Bay, Cooktown, AMS I. 14515; Murray River, Hinchinbrook Passage, QM I. 16543, QM I. 16546; Cape Cleveland, QM I. 5626; Townsville, QM I. 12233; Cape Bowling Green, QM I. 1966, QM I. 1968; Burdekin River, AMS I. 18330-1 (2), AMS I. 18333; Mackay, NMNZ P. 10166 (5); Yeppoon, QM I. 11625, QM I. 11637; Keppel Sands, AMS IA. 7700; Mackenzie I., Fitzroy River, AMS IB. 1259-60 (2); Wide Bay, AMS I. 9501-2 (2); Sandgate, QM I. 333; Logan River, QM I. 10889 (2); Redland Bay, QM I. 8054; Moreton Bay, N. of N.E. corner of St. Helena I., QM I. 10099; Pelican Banks, AMS I. 19565-001 (2+1 skeletonized), no further data, AMS I. 7734, AMS I. 12556, QM I. 334, QM I. 13103, WAM P. 25737-009.

New South Wales — Iluka, AMS I. 18061-005 (5); Smith's Lake, NMNZ P. 10165; Australia — ANSP 121574.

Marilyna meraukensis (de Beaufort, 1955)

(Figs. 2A, B; 5B; 6A)

Tetrodon staigeri (not of Castelnau). Webber, 1908, 209, 212, 216, 264; de Beaufort, 1955, 53.

Sphoeroides meraukensis. de Beaufort, 1955, 53-54.

Torquigener meraukensis. Munro, 1956, 294.

Takifugu meraukensis. Munro, 1967, 549; Allen, 1975, 95.

DIAGNOSIS

Marilyna with spines covering body from posterior of nasal organs to about mid-way between pectoral and dorsal fins; dorsal colour pattern consists of small irregular, dark spots, lessening in intensity in adults, dorsal bands lacking. Upper and lower lateral lines meet on caudal peduncle.

Prefrontals anterolaterally pointed, posterolaterally rounded, with extensive foramina; sphenotic wings extend anterolaterally over orbit in close contact with frontals; small triturating teeth present on upper jaw.

DESCRIPTION

The following meristic counts and proportions are for the lectotype (196 mm SL), and, in parenthesis, the range for 8 paralectotypes (16-158 mm SL) and 13 non-type specimens (73-161 mm SL).

Dorsal rays 11 (10-11); anal rays 9 (9-11); pectoral rays 19 (17-20); caudal rays 11 (11); vertebrae (8 + 9, 8 + 10).

Body robust, broadly rounded dorsally and flattened ventrally, elongate, tapering to a deep caudal peduncle. Head length 3.4 (2.9-3.3) in SL; snout to anterior of vent 1.6 (1.4-1.6) in SL, to origin of dorsal fin 1.5 (1.4-1.5) in SL, to origin of anal fin 1.4 (1.3-1.5) in SL, to origin of pectoral fin 2.9 (2.6-2.8) in SL; body width at base of pectoral fin 3.6 (2.7-3.4) in SL; depth from dorsal fin origin to anal fin origin 4.1 (3.8-4.3) in SL; body depth at posterior end of dorsal fin base 5.8 (5.4-6.4) in SL; least depth of caudal peduncle 8.5 (7.5-9.1) in SL.

Mouth small and terminal on a short snout, width 1.8 (2.2-2.7) in HL; lips thick, covered with numerous short papillae. Chin lacking. Nasal organ a short flattened papilla, posteriorly just level with eye, with 2 widely separated openings, the posterior one larger; inner surface of papilla with a large fold sited posteriorly on medial portion and about 4 smaller folds sited posteriorly on the ventral portion. Snout to anterior edge of nasal organ 2.2 (2.9-3.6) in HL; posterior edge of nasal organ to anterior edge of eye 6.4 (6.1-7.0) in HL.

Eye round, moderate in size and rim completely adnate, with the upper border just below dorsal profile, and the lower border just above level of mouth corner; horizontal diameter 5.3 (4.3-5.4) in HL. Anterior edge of gill opening smooth. Posterior of eye to dorsal corner of gill opening 1.5 (1.7-2.0) in HL.

Pectoral fin margins rounded; 1st ray very short; maximum length of fin from base 5.9 (5.4-6.7) in SL; top of fin base well above lower margin of eye. Dorsal fin located posterior to vent, fails to meet caudal fin base, distal margin bluntly pointed; 1st ray 10.9 (10.3-18.4) in SL; longest ray 5.8 (5.1-6.4) in SL; base length 8.9 (8.6-10.7) in SL and 1.5 (1.4-1.8) in longest ray. Anal fin base below posterior half of dorsal fin base, distal margin bluntly pointed and fails to reach caudal fin base; 1st ray 11.5 (11.1-20.1) in SL; longest ray 5.6 (5.4-6.4) in SL; base length 12.3 (10.6-14.0) in SL and 2.2 (1.9-2.3) in longest ray. Caudal fin truncate, maximum length 4.5 (3.8-4.9) in SL.

Ventrolateral skin fold extending from behind pectoral fin to caudal fin. Lateral line fairly distinct, encircling eye with a pre-opercular branch dropping to anterolateral limit of belly, running dorsolaterally along body towards caudal fin, rising over pectoral fin and gently dropping under dorsal fin to the lower one-third of the caudal peduncle, before rising to the middle of the caudal fin base; dorsolateral branches of lateral line above pectoral fin base not meeting in midline; anterodorsal branch anterior to nasal papillae almost meeting in midline; second lateral line dropping from behind mouth corner, extending along lateral region of belly and curving almost to pectoral fin base, continuing along belly from posterior limit of belly spines, crossing over ventrolateral skinfold to meet upper lateral line about half-way along caudal peduncle. Body spines multi-rooted, all short and surrounding body from behind nasal organs to about mid-way between pectoral and dorsal fins.

Colour in alcohol: base colour pale or greyish-brown, usually with dense dorsal covering of small, irregular brown spots. These are especially distinctive in younger specimens but tend to lessen in intensity in larger forms (see de Beaufort, 1955), although still discernable in the largest specimen examined here (SL = 161 mm). Dark patch at base of pectoral fin, otherwise fins and belly pale.

DISTRIBUTION

It is recorded from north-west Western Australia to the Gulf of Carpentaria and also from Merauke River, West Irian.

REMARKS

Superficially more similar to *M. darwinii* than to its other congener, *M. meraukensis* is the only *Marilyna* species that apparently lacks any form of banded colour pattern.

The meeting of upper and lower lateral lines on the caudal peduncle is only considered to be of specific significance, despite the higher level of significance usually accorded to lateral line pattern (for example, by Fraser-Brunner, 1943).

Although *M. meraukensis* is now known from an extensive northern Australian coastline, it has only previously been recorded from Western Australia, in the Prince Regent River (Allen, 1975).

De Beaufort (1955), although noting the total length of the largest of his examples of *meraukensis,* did not specify a holotype. However, the largest (ZMA 104.139), in the Type Catalogue of the Zoological Museum (currently in press, Dr. H. Nijssen, pers. comm.), is nominated as lectotype. Only 5 specimens apparently remain from the original series of 6 collected by Koch (see Weber, 1908, de Beaufort, 1955).

SPECIMENS EXAMINED

(n = 25; 2 or more specimens in a lot indicated by number in parenthesis).

Lectotype: ZMA 104.139, 196 mm SL, Batavian Marine Research Laboratory Coll., Dec. 1937, Merauke R., West Irian.

Paralectotypes: ZMA 104.140 (3), 65-86 mm SL, data as for lectotype; ZMA 104.141 (5), 16-158 mm SL, Dr Koch, 1904, Merauke R., West Irian.

Non-type specimens: Western Australia — Prince Regent River, Kimberley District, WAM P. 25038-003; Kalumbaru Mission, WAM P. 13485; Forest River Mission, AMS IB. 2835, 2837-8 (3); Medusa Bank, WAM unnumbered:

Northern Territory — Mickett Ck., Shoal Bay, NTFD unnumbered; Cape Condor, Melville Island, AMS IA. 7817; Darwin, NMNH B. 1476 (1 of 2 specimens):

Queensland — Gulf of Carpentaria, 17° 30.6′S 140° 32.6′E, CSIRO A. 2896, 17° 37′S 140° 13.8′E, CSIRO C. 3408, no further data, CSIRO C. 3646; Norman River, QM I. 10851 (3 + 1 skeletonized).

Marilyna darwinii (Castelnau, 1873)

(Figs. 3A, B; 5C)

Tetrodon darwinii Castelnau, 1873, 94; MacLeay, 1881, 277; ———, 1882, 341.

Tetraodon darwini. Le Danois, 1961, 473.

Tetrodon fasciatus (not of Bloch & Schneider; not of McClelland) MacLeay, 1878, 365, 367, Pl. 10; ———, 1881, 276; ———, 1882, 340; Regan, 1903, 302; Fowler, 1928, 471; de Beaufort, 1962, 383.

Tetrodon pleurostictus. Regan, 1903, 302 (part); Weber, 1908, 209, 212, 216, 264; de Beaufort, 1962, 383.

Sphoeroides pleurostictus. Fowler, 1928, 468 (part); de Beaufort, 1962, 376, 382-3 (part); Taylor, 1964, 297; Roberts, 1978, 70.

Spheroides pleurostictus. McCulloch, 1929-30, 431 (part); Marshall, 1964, 493-4, colour pl. 70 (part); ———, 1966, 221, colour pl. 70 (part).

Torquigener pleurostictus. Fraser-Brunner, 1943, 11 (part); Munro, 1956, 294.

Colomesus fasciatus (not of Bloch & Schneider). Le Danois, 1959, 211, 246, 253, 255 (part); Tyler, 1964, 127 (part).

Gastrophysus pleurostictus. Whitley, 1965, 59 (part); Carcasson, 1977, 275 (part).

Torafugu pleurostictus. Munro, 1967, 549.

Tetraodon fasciatus. Stanbury, 1969, 210.

DIAGNOSIS

Marilyna with spines restricted to dense patches on dorsum, extending from level with nasal organs to posterior of pectoral fin; and on belly, distributed from level with posterior margin of eyes almost to vent; occasionally a few spines scattered on sides anterior to pectoral fin. Three broad, dark coloured bands cross dorsum, but usually absent from caudal penduncle.

Prefrontals somewhat rectangular in outline, with very extensive olfactory nerve foramina. Sphenotic wings extend anterolaterally over orbit, well clear of frontals. Distinct triturating teeth lacking from upper jaw.

DESCRIPTION

The following meristic counts and proportions are for 25 non-type specimens (53-148 mm SL).

Dorsal rays 10-11; anal rays 8-9; pectoral rays 17-19; caudal rays 11; vertebrae 8 + 11, 9 + 11.

Body robust, broadly rounded dorsally and flattened ventrally, elongate, tapering to a deep caudal penduncle. Head length 2.7-3.3 in SL; snout to anterior of vent 1.5-1.6 in SL, to origin of dorsal fin 1.4-1.5 in SL, to origin of anal fin 1.4-1.5 in SL, to origin of pectoral fin 2.6-2.8 in SL; width of body at base of pectoral fin 2.8-3.2 in SL; depth from dorsal fin origin to anal fin origin 3.8-4.4 in SL; body depth at posterior end of dorsal fin base 5.2-6.0 in SL; caudal peduncle length 4.0-4.7 in SL; least depth of caudal peduncle 7.5-8.8 in SL.

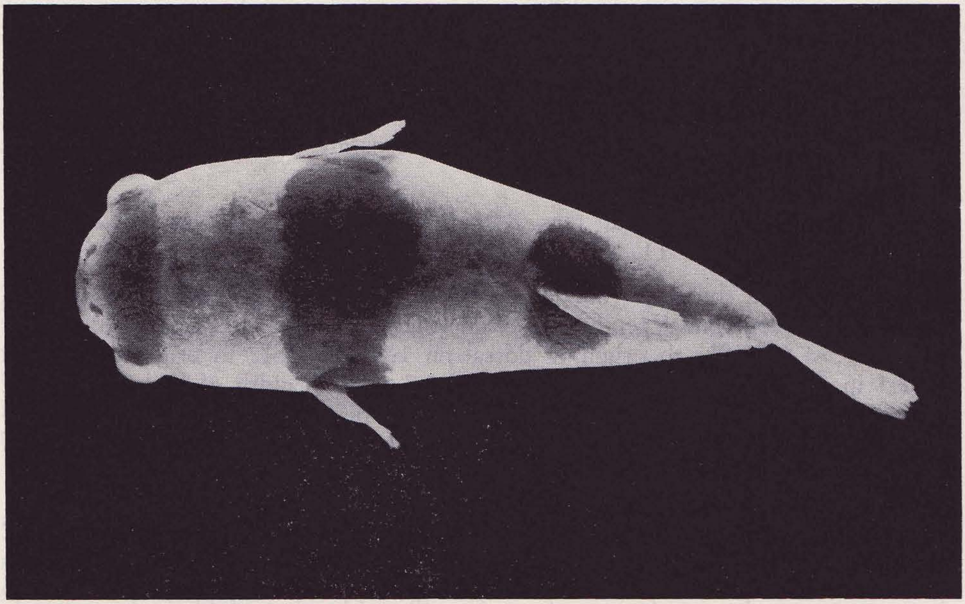
Mouth small and terminal on a short snout; width 2.5-3.5 in HL. Lips thick, covered with numerous short papillae. Chin lacking. Nasal organ a short, flattened papilla, posteriorly just level with eye, with 2 widely separated openings, the posterior one largest; inner surface of papilla with a large fold sited posteriorly on medial portion and 3-9 smaller folds sited posteriorly on the ventral portion. Snout to anterior edge of nasal organ 2.9-3.9 in HL; posterior edge of nasal organ to anterior edge of eye 6.7-9.5 in HL.

Eye round, moderate in size, and rim completely adnate with the upper border just below dorsal profile, and the lower border just above level of mouth corner; horizontal diameter 3.8-4.9 in HL. Anterior edge of gill opening smooth. Posterior of eye to dorsal corner of gill opening 1.9-2.1 in HL.

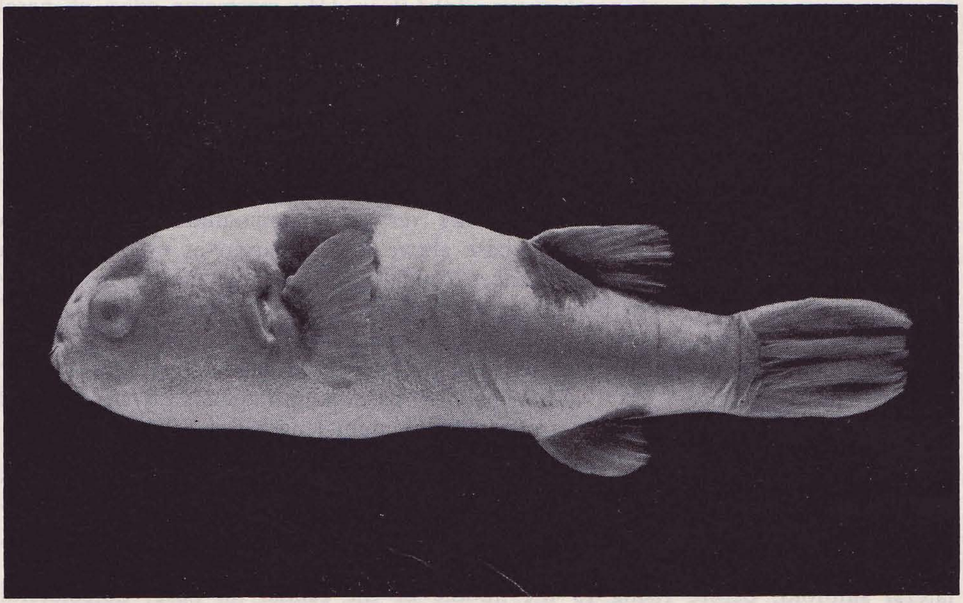
Pectoral fin margins rounded; 1st ray very short; maximum length of fin from base 5.6-6.9 in SL; top of fin base above lower margin of eye. Dorsal fin located posterior to vent, fails to meet caudal fin base, distal margin bluntly pointed; 1st ray 7.0-15.4 in SL; longest ray 5.0-6.2 in SL; base length 9.0-10.7 in SL and 1.5-2.0 in longest ray. Anal fin base below posterior half of dorsal fin base, distal margin bluntly pointed and fails to reach caudal fin base; 1st ray 9.0-15.3 in SL; longest ray 5.3-6.1 in SL; base length 12.1-15.8 in SL and 2.0-2.8 in longest ray. Caudal fin truncate; maximum length 3.4-4.2 in SL.

Ventrolateral skin fold extending from behind pectoral fin to caudal fin. Lateral line fairly distinct, encircling eye with a pre-opercular branch dropping to anterolateral limit of belly, running dorsolaterally along body towards caudal fin, rising over pectoral fin and sharply dropping under dorsal fin almost to ventrolateral skinfold, before rising to the middle of the caudal fin base; dorsolateral branches of lateral line above pectoral fin base not meeting in midline; antero-

Fig. 3. *Marilyna darwinii* NMNZ P. 10167, 127 mm SL.



A. Dorsal view.



B. Lateral view.

dorsal branch anterior to nasal papillae almost meeting in midline; second lateral line dropping from behind mouth corner, extending along lateral region of belly and curving almost to pectoral fin base, continuing along belly from posterior limit of belly spines, medial to ventrolateral skin fold, almost to caudal fin. Body spines multi-rooted, all short and usually restricted to two dense arrangements, one mid dorsally in a rounded patch from nasal organs to posterior margin of pectoral fins, and the other mid ventrally in a larger patch extending from posterior margin of eyes almost to vent; occasionally a few spines on sides anterior to pectoral fin.

Colour in life (based on underwater observations): dorsum greenish-yellow with grey mottling; 3 broad, dark bands cross dorsum between eyes at mid-dorsum and at dorsal fin base; sides with a yellow-silverish sheen; belly and chin white; all fins bright yellow.

Munro (1967) recorded a dark bar also on the posterior end of the caudal peduncle, in examples, which he called *Torafugu pleurostictus,* from New Guinea.

DISTRIBUTION

It is recorded from the extreme north-east coast of Cape York Peninsula, N. Queensland, and extending along the northern Australian coastline to Cape Lambert, N.W. Western Australia, and also from Daru, Papua New Guinea.

REMARKS

This species was first described from Port Darwin, N.T., by Castelnau (1873) (as *Tetrodon darwinii*). Although much of the description is non-specific, the following characteristics were described; broad back, in part spiny; prominent nasal organs; obtuse snout; no trace of spots. The colour (based on a preserved specimen) was suggested as yellow, with the upper parts slaty blue, and with yellow fins. The yellow may be an artifact. Significant however is the absence of spots in a "three and a half inch" specimen, which is most suggestive that the congener, *M. meraukensis,* was not the species being described. Consequently, I am of the opinion that Castelnau's specimen was of the species later described by MacLeay (1878) as *Tetrodon fasciatus,* and still later, included in the synonomy of *T. pleurostictus* Günther by Regan (1903).

The name *darwinii* has received little acknowledgement from ichthyologists, and MacLeay (1878, 1881, 1882) completely overlooked the significant points made in Castelnau's description, whilst describing and later listing *fasciatus* in his various catalogues of Australian fishes. Regan's (1903) synonymisation of the species (which he referred to as *T. fasciatus*) with *pleurostictus,* did not take into account the significant differences of spination in the two species, an aspect noted but not resolved by de Beaufort (1962). The only reference to *T. darwinii* this century was in the synonymy of *Colomesus fasciatus* given by Le Danois (1959), an unfortunate grouping of species under the latter name, and in that author's (1961) catalogue of types in the Paris Museum. In the type catalogue, three examples are listed (as Holotype!), but my reading of Castelnau's description strongly suggests that only a single specimen was described. My examination of the Paris Museum specimens shows NMNH B. 1475 to be *darwinii* and B. 1476 (2 spms) to be *darwinii* and *meraukensis.* The degree of shrinkage undergone by the largest specimen (B. 1475) is unknown; however the specimen would now seem to be rather too small when compared with Castelnau's measurement of three and a half inches. The type status thus remains unresolved.

Material examined

(n = 47; 2 or more specimens in a lot indicated by number in parenthesis).

Western Australia — Derby, SAM F. 92; W. of Cape Lambert, WAM P. 7611: Northern Territory — Cape Conder, Melville I., AMS IA. 7815-6 (2); Darwin, AMS I. 16426-001 (11) (Types of *T. fasciatus* MacLeay), NMNH B. 1475, 1476, (1 of 2 spms); Nightcliffe, USNM 173983:

Queensland — Escape River estuary, Cape York Peninsula, AMS I. 20929-009 (2), QM I. 15859; Weipa, NMV A. 560; Gulf of Carpentaria, Norman R., AMS I. 15552-021 (3 + 1 skeletonized), CSIRO A. 3655; Karumba Point, NMNZ P. 10167 (4); Karumba, AMS unreg., 17° 37.0′S 140° 13.8′E, 2m, CSIRO C. 3407:

Papua New Guinea — Daru, USNM unreg. (10). No data — SAM F. 2159 (4).

Key to *Marilyna* species

1. Dorsum completely devoid of spines .... *pleurosticta*
   Dorsum with spines 2
2. Spines very sparse or absent from lateral surface of body; three dark bands across dorsum .... *darwinii*
   Spines dense on lateral surface of body; dorsum may be spotted, but never with bands .... *meraukensis*

Reicheltia n. gen.

Type species: *Sphaeroides halsteadi* Whitley, 1957, 70, fig. 12.

Diagnosis

Same for *R. halsteadi* (Whitley)

Etymology

The genus is named for John and Bonnie Reichelt, friends who assisted in seine netting along the southern New South Wales coast, whereby new locality records for *R. halsteadi* were obtained.

Remarks

Reicheltia is a monotypic genus established for *Sphaeroides halsteadi* Whitley, previously recognised only from Sydney Harbour. Although possessing a completely adnate eye and ventrolateral skin fold, characteristics common also to *Marilyna, Reicheltia* differs from the latter, in having a less robust, dorsally flattened body form, with the eye level with or slightly interrupting the dorsal profile. In addition, the different structure of neural spines on the caudal peduncle of *Reicheltia halsteadi* results in it having a significantly smaller 'least caudal peduncle depth' than similarly sized *Marilyna* specimens (see fig. 6). Because of the rather generalised structure of the axial skeleton in *Torquigener* and related genera, little has been forthcoming by way of generic characteristics from this structure. In this instance, however, the relatively short and broad neural spines of *Reicheltia* serve to distinguish the genus from *Marilyna.*

Reicheltia halsteadi (Whitley, 1957)

(Figs. 4A, B, C; 5D; 6B)

Amblyrhynchotus oblongus (not of Bloch). Waite, 1900, 207 (part); Allen *et al.,* 1976, 441 (part).

Spheroides oblongus (not of Bloch). Waite, 1904a, 218.

Sphaeroides oblongus (not of Bloch). Waite, 1904b, 57.

Sphaeroides halsteadi Whitley, 1957, 70, Fig. 12; ———, 1965, 59.

Diagnosis

A species, representing a monotypic genus of tetraodontid fishes, with the following combination of characters; nasal organ with two small, almost equally sized openings; eye rim completely adnate; top of pectoral fin base below lower margin of eye, ventrolateral skin fold present; shallow caudal peduncle (least depth > 9.5 x in SL); prefrontals moderately large, rounded, each with a small olfactory nerve foramen; frontals wide over orbit; sphenotic not contacting supraoccipital; triturating teeth absent; spines restricted to nape and belly.

Description

The following meristic counts and proportions are for the holotype (97 mm SL) and, in parenthesis, the range for 28 non-type specimens (24-120 mm SL).

Dorsal rays 10 (9-11); anal rays 7 (7-8); pectoral rays 16-17 (15-18); caudal rays 11 (11); vertebrae $8 + 10$ ($7 + 10$, $8 + 10$, $8 + 11$, $9 + 10$).

Body elongate, rounded dorsally and somewhat flattened ventrally, tapering to a narrow caudal peduncle. Head length 3.2 (2.7-3.3) in SL; snout to anterior of vent 1.5 (1.5-1.6) in SL, to origin of dorsal fin 1.5 (1.4-1.5) in SL, to origin

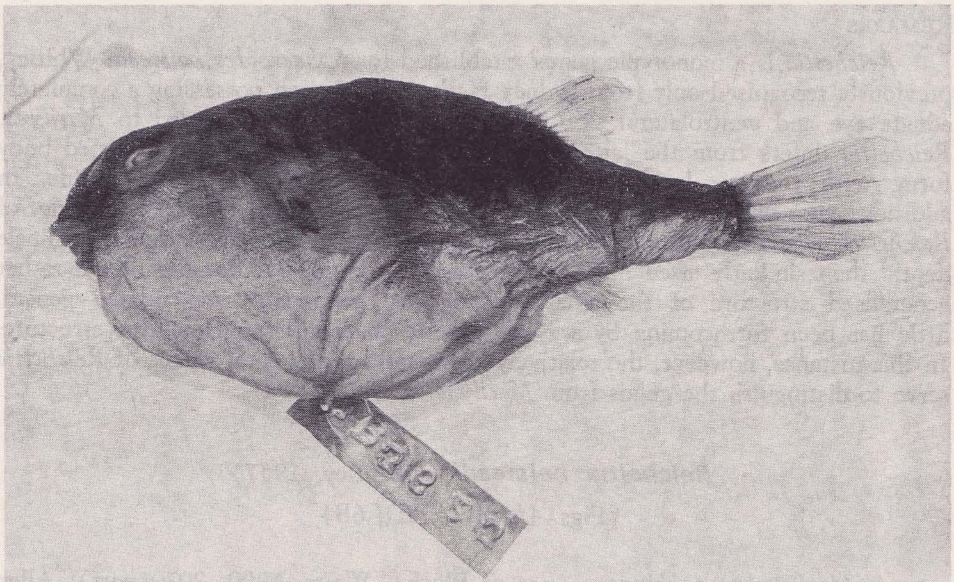


Fig. 4a. *Reicheltia halsteadi*
Holotype, AMS IB. 3623, 97 mm SL.

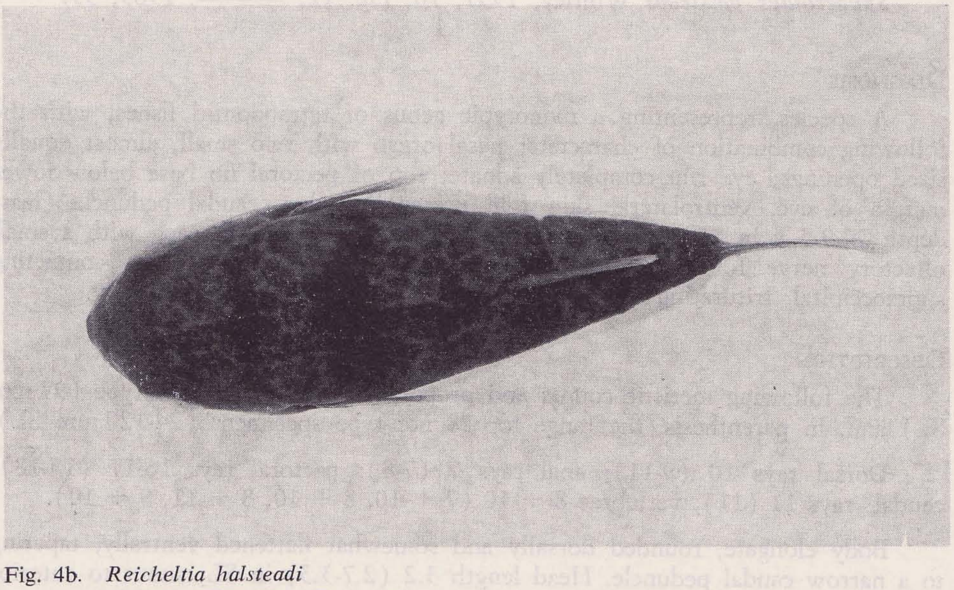


Fig. 4b. *Reicheltia halsteadi*
AMS I. 17759-002, 67 mm SL, dorsal view.

of anal fin 1.4 (1.3-1.4) in SL, to origin of pectoral fin 3.0 (2.5-3.0) in SL; body width at base of pectoral fin (distorted in holotype) (2.9-3.8) in SL; depth from dorsal fin origin to anal fin origin 3.8 (3.8-4.5) in SL; depth of body at posterior of dorsal fin 5.2 (5.2-6.6) in SL; caudal peduncle length 4.7 (4.2-4.8) in SL; least depth of caudal peduncle 11.7 (9.9-11.9) in SL.

Mouth small, terminal, width 3.2 (2.7-3.6) in HL. Lips moderately thick, covered with numerous short papillae. Chin lacking. Nasal organ a short, flattened papilla, anterior to eye, with 2 widely separated openings, posterior opening slightly larger; inner surface of papilla with several well developed flaps around circumference. Snout to anterior edge of nasal organ 2.9 (2.5-3.5) in HL; posterior edge of nasal organ to anterior edge of eye 8.4 (5.4-8.5) in HL.

Eye round, moderate in size, and rim completely adnate, with the upper border level with or slightly interrupting dorsal profile, and the lower border well above level of mouth corner; horizontal diameter 3.8 (2.9-3.9) in HL. Anterior edge of gill opening smooth. Posterior of eye to dorsal corner of gill opening 2.4 (2.1-2.7) in HL.

Pectoral fin margins rounded; 1st ray very short; maximum length of fin from base (fin damaged in holotype) (4.6-6.2) in SL; top of fin base just below lower margin of eye. Dorsal fin located about level with vent, fails to meet

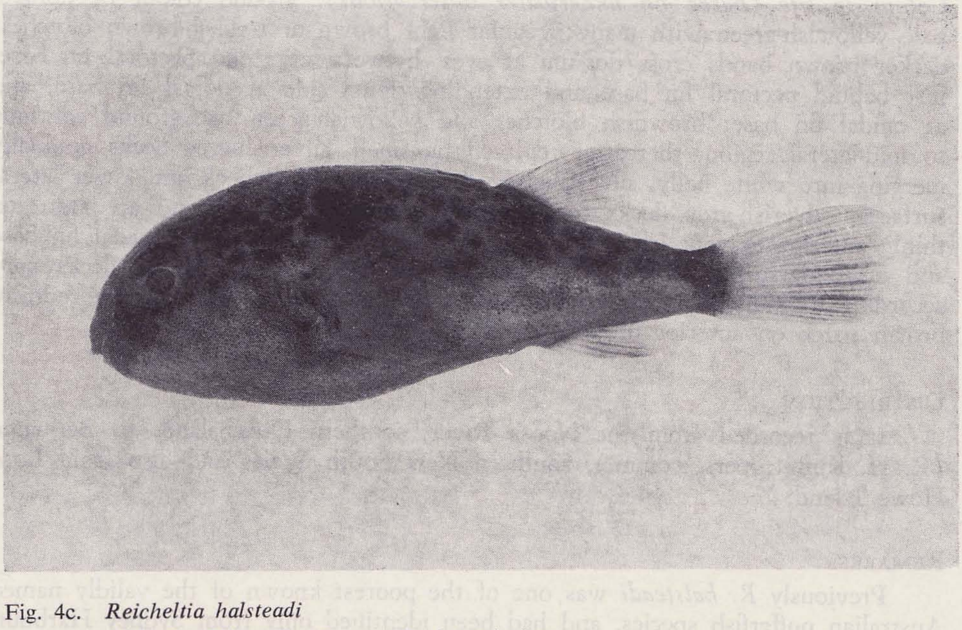


Fig. 4c. *Reicheltia halsteadi*
AMS I. 17759-002, 67 mm SL, lateral view.

caudal fin base, distal margin rounded; 1st ray 26.9 (8.0-27.6) in SL; longest ray 6.3 (4.8-6.3) in SL; base length 9.8 (8.9-11.4) in SL and 1.6 (1.5-1.9) in longest ray. Anal fin base below posterior half of dorsal fin base, distal margin rounded and fails to reach caudal fin base; 1st ray 17.0 (8.9-24.3) in SL; longest ray (damaged in holotype) (5.3-7.5) in SL; base length 17.6 (14.1-19.0) in SL and 1.9 (1.9-3.1) in longest ray. Caudal fin rounded ventrally, otherwise truncate; maximum length 4.6 (3.4-4.6) in SL.

Ventrolateral skin fold extending from behind pectoral fin margin to caudal fin; lateral line with small associated papilla, the line distinct on head and dorsum, indistinct on caudal peduncle, encircling eye with an anterodorsal branch almost meeting mid-dorsally anterior to nasal organ and a pre-opercular branch extending almost to pectoral fin base; dorso-lateral branches of lateral line above pectoral fin base may meet in midline; second lateral line dropping from behind mouth corner, extending along lateral region of belly to pectoral fin base; body spines short, 2-rooted, densely scattered on dorsum from between eyes to midway between pectoral fin base and anterior end of dorsal fin base, and on belly from beneath eyes to about 2/3 distance between pectoral fin base and vent; lateral surface free of spines.

Colour in alcohol (holotype): dorsum to mid-lateral surface dark brown; slightly darker bands cross mid-dorsal region and at base of dorsal fin; lower lateral surface silvery with many very small darker flecks; belly uniformly pale.

Colour in life (based on underwater observations): ground colour of dorsum pale yellowish-green with many irregular light brown or reddish-brown blotches; darker brown bands cross dorsum at eyes, between eyes and pectoral fin base, just behind pectoral fin base and extending down side at dorsal fin base, and at caudal fin base; brownish blotches and yellowish-green background continue to mid-lateral region, thereafter replaced by small, silverish-grey flecks gradually merging into white belly, silverish-grey sheen obvious on cheek and lower lateral surfaces; silverish-grey flecks form dense band under mouth, and are scattered thinly anterior to vent on spineless region of belly, at posterior of anal fin base and on undersurface of caudal peduncle (intensity and number of flecks vary according to individual); spinose region of belly white; all fins pale, a reddish-brown patch on anterior of pectoral fin insert.

DISTRIBUTION

It is recorded from the Noosa River, southern Queensland, to Bermagui (R. H. Kuiter, pers. comm.), southern New South Wales and also from Lord Howe Island.

REMARKS

Previously *R. halsteadi* was one of the poorest known of the validly named Australian pufferfish species, and had been identified only from Sydney Harbour. However, referring to examples obtained by the "Thetis" Expedition (AMS I. 4060-2

(3 spms)), Waite (1900) reported the species from Lord Howe Island, under the name *Amblyrhynchotus oblongus.*

Other (larger) specimens referred to *A. oblongus* by Waite (1900) were examples of *Torquigener pleurogramma,* and were recorded separately by Waite (1904a) as *Spheroides hypselogeneion.* The reference to *Sphaeroides oblongus* from New South Wales by Waite (1904b) is most likely also referrable to *Reicheltia halsteadi.*

MATERIAL EXAMINED

(n = 78; 2 or more specimens in a lot indicated by number in parenthesis). *Holotype*: AMS IB. 3623, 97 mm SL, G. P. Whitley, 18/8/56, Chinaman's Beach, Middle Harbour, Sydney, N.S.W.

Non-type specimens: Queensland — Noosa R., QM I. 13769; Point Lookout, AMS IB. 2825, 18 m, QM I. 10882 (8); Stradbroke I., AMS IA. 6921, QM I. 10876 (5):

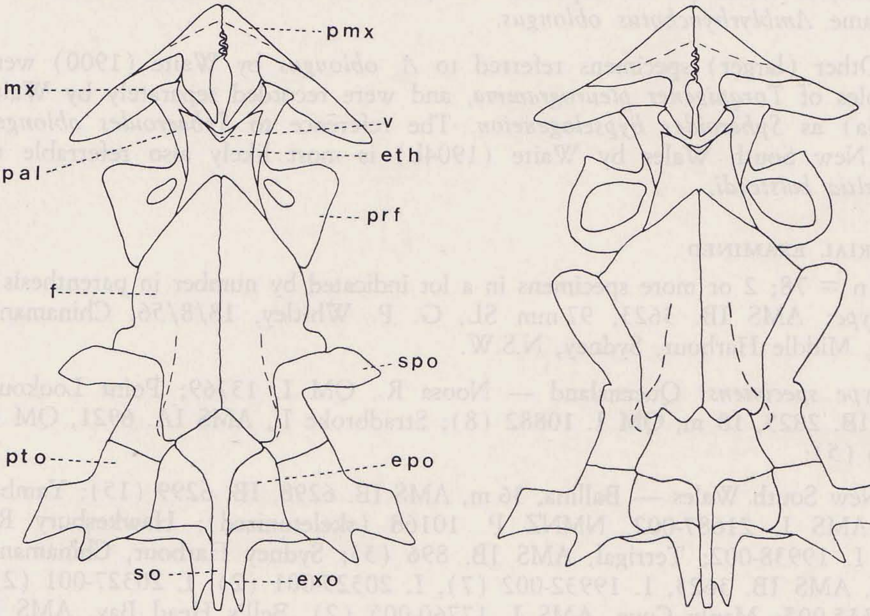
New South Wales — Ballina, 36 m, AMS IB. 6298, IB. 6299 (15); Yamba, 2 m, AMS I. 21687-002, NMNZ P. 10168 (skeletonized); Hawkesbury R., AMS I. 19938-002; Terrigal, AMS IB. 896 (3); Sydney Harbour, Chinaman's Beach, AMS IB. 3623, I. 19932-002 (7), I. 20325-001 (2), I. 20327-001 (2), I. 20335-005; Manly Cove, AMS I. 17760-005 (2), Bell's Head Bay, AMS I. 19934-002 (2); Middle Harbour, AMS I. 17023-001, I. 17759-002, Rose Bay, AMS I. 17927-002 (2), no further data, AMS I. 17215-002; Botany Bay, CSIRO C. 3710; Wattamolla Beach, 1 m, NMNZ P. 10169; Shoalhaven Bight, AMS IA. 7269-70 (2); Jervis Bay, AMS I. 21737-001 (7); Moruya, 1 m, AMS I. 21683-002 (3):

Lord Howe Island — AMS I. 4060-2 (3).

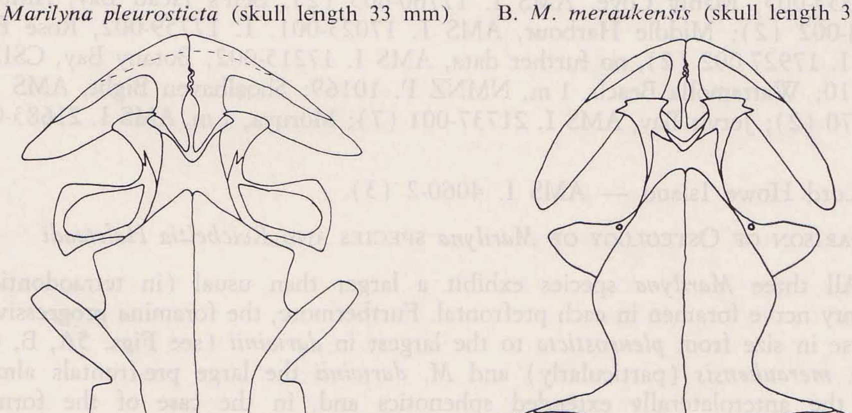
COMPARISON OF OSTEOLOGY OF *Marilyna* SPECIES AND *Reicheltia Halsteadi*

All three *Marilyna* species exhibit a larger than usual (in tetraodontids) olfactory nerve foramen in each prefrontal. Furthermore, the foramina progressively increase in size from *pleurosticta* to the largest in *darwinii* (see Figs. 5A, B, C). In *M. meraukensis* (particularly) and *M. darwinii* the large pre-frontals almost meet the anterolaterally extended sphenotics and, in the case of the former, largely exclude the frontals from the lateral edge of the orbit roof. Although the sphenotics are anterolaterally extended in *M. darwinii* as much as in *M. meraukensis,* the frontals in the former species are indented slightly over the orbit. The least specialised of the three species, *M. pleurosticta,* has the sphenotic wings shorter, and laterally produced, with correspondingly greater frontal contribution to the lateral orbit roof (see also Tyler, 1980, Fig. 267). In all three species, the frontals are reduced posteriorly, enabling contact to a greater or lesser degree of the sphenotic with the supraoccipital, a condition also characteristic of *Contusus* (Hardy, 1981b).

Fig. 5. Skull osteology of:



A. *Marilyna pleurosticta* (skull length 33 mm) B. *M. meraukensis* (skull length 31 mm)



C. *M. darwinii* (skull length 43 mm) D. *Reicheltia halsteadi* (skull length 41 mm)

Abb.: epo, epiotic; eth, ethmoid; exo, exoccipital; f, frontal; mx, maxillary; pal, palatine; pmx, premaxillary; prf, prefrontal; pto, pterotic; so, supraoccipital; spo, sphenotic; v, vomer.

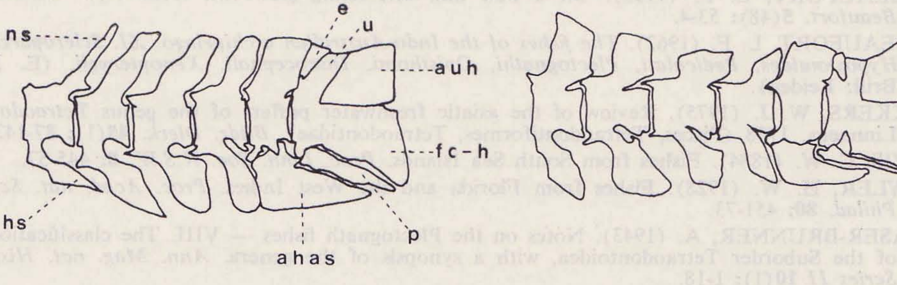
Olfactory nerve foramina in the prefrontals of *R. halsteadi* are very much smaller than in *Marilyna* species and frontal contribution to the lateral edge of the orbit roof very much greater, owing to the smaller prefrontals and sphenotics (see Fig. 5D). The frontals widen over the orbit, reaching a maximum just posterior to their contact with the prefrontals, and are sufficiently wide posteriorly to exclude contact of the sphenotics with the supraoccipital. In addition, the frontals are extended anteriorly over a greater part of the ethmoid in *R. halsteadi* than in *Marilyna.* Of the 4 species, only *R. halsteadi* has the prefrontals failing to contact the palatines.

In both genera, the parasphenoid extends dorsally to the frontal, but with the septum incomplete, and prootic medial prongs absent. Triturating teeth are absent from *R. halsteadi* and *M. darwinii* but present though small, on the upper jaw in *M. pleurosticta* and *M. meraukensis.*

An interhyal is absent and dorsal hypohyal present in all species, with the branchial skeleton being similar throughout. The first pharyngobranchial is relatively narrow and curved, bearing many minute teeth, while the second and third pharyngobranchials have about 12 (16 in the second element in *R. halsteadi*) bulbous teeth; all species have a single row and three double rows of poorly developed gill rakers.

The axial and caudal skeletons are similar in most respects, being essentially typical of tetraodontids (see Tyler, 1964, 1980). In the four species, complete haemal arches are present on the 4 or 5 posteriormost abdominal vertebrae, and a small supraneural is present. Dorsal fin basal pterygiophores number 10 and anal fin basal pterygiophores number 6 (5 in *meraukensis* and *pleurosticta*). A significant difference between *Marilyna* and *Reicheltia* exists however, in the shape and height of the caudal vertebrae neural spines posterior to the dorsal pterygiophores

Fig. 6. Posteriormost caudal vertebrae and caudal skeleton:



A. *Marilyna meraukensis* B. *Reicheltia halsteadi*

Abb.: ahas, autogenous haemal arch and spine; auh, autogenous upper hypural plate; e, epural; fc-h, fused centrum-lower hypural plate; hs, haemal spine; ns, neural spine; p, parhypural; u, urostylar process.

(see Fig. 6A, B). Those of *Marilyna* species are consistently narrower and longer than the corresponding elements in *Reicheltia,* resulting in the deeper caudal peduncle in the former. A well developed urostylar process is present in both genera.

ACKNOWLEDGEMENTS

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